



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/817,633	04/01/2004	Jian Sun	MS1-1883US	2832
22801	7590	07/17/2007		
LEE & HAYES PLLC 421 W RIVERSIDE AVENUE SUITE 500 SPOKANE, WA 99201			EXAMINER THOMAS, MIA M	
			ART UNIT	PAPER NUMBER
			2624	
			MAIL DATE	DELIVERY MODE
			07/17/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/817,633

Applicant(s)

SUN ET AL.

Examiner

Mia M. Thomas

Art Unit

2624

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-12, 14-22, 24-30, 32-35 and 37-40 is/are rejected.
- 7) ☒ Claim(s) 13, 23, 31 and 36 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 April 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date see attached.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- ☐ Notice of Informal Patent Application
- ☐ Other: ____.

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention as specified in the claims. Therefore, the underexposed image (I_L) of Figure 1 should be represented by some image with a visible contrast. A clear resolution must be present otherwise; Figure 1 would be interpreted as a blank diagram (image). Figures 2, 3, 9-11, 12, 16, 18-28 also have a very poor contrast and with reference to Figures 12, 16 and 18 specifically, there is no visible image apparent. It is also difficult to understand applicant's invention without the appropriate distinguishing characteristics for these images. The aforementioned figures also must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the

Art Unit: 2624

remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the examiner does not accept the changes, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 9, 27 and 38 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As stated in claim 9 on page 37, line 9, in Claim 27 on page 41, line 9 and at Claim 38 on page 44, line 14; applicant claims a method, computer program and apparatus which is further comprising modifying a color mapping function of the two images to cover a *relatively larger range* for a high contrast scene. How much larger is "relatively" larger? The fact is that claim language, including terms of degree may not be precise. The term "relatively" is held as indefinite because there is a lack of a universal standard for measuring the degree intended for relatively larger to one of ordinary skill in the art.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1, 5-8, 10, 12, 15, 16, 26, 28, 30,37, 39 and 40 are rejected under 35 U.S.C. 102(e) as being anticipated by Chen (US 6,556,704).

Regarding Claim 1: Chen discloses providing two images of a same scene (Refer to Figure 1, numeral 13a and 13b); determining a spatial coherence and color statistics of the two images (“...(a) generating intensity parameters corresponding to image features in each of two intensity images of a scene...” at column 3, line 33); and utilizing the determined color statistics and spatial coherence to enhance one of the two images (“the intensity parameters in one image pairing with intensity parameters in the other image to form pairs of intensity parameters indicative of potential correspondence between features in the two intensity images...” at column 3, line 34).

Art Unit: 2624

Regarding Claim 26: Chen discloses one or more computer-readable media having instructions stored thereon that, when executed, direct a machine to perform acts comprising: providing two images of a same scene; determining a spatial coherence and color statistics of the two images; and utilizing the determined color statistics and spatial coherence to enhance one of the two images ("A compact disk-read only memory (CD-ROM) 122 is connected to the microprocessor based unit 112 for receiving software programs and for providing a means of inputting the software programs and other information to the microprocessor based unit 112 via a compact disk 124, which typically includes a software program." at column 6, line 6).

Regarding Claim 37: Chen discloses an apparatus comprising: means for providing two images of a same scene (Refer to Figure 1, numeral 12; two vertically mounted cameras 11a and 11b); means for determining a spatial coherence and color statistics of the two images ("The computer system 110 includes a microprocessor-based unit 112 for receiving and processing software programs and for performing other processing functions." at column 5, line 61); and means for utilizing the determined color statistics and spatial coherence to enhance one of the two images ("A display 114 is electrically connected to the microprocessor-based unit 112 for displaying user-related information associated with the software. A keyboard 116 is also connected to the microprocessor based unit 112 for permitting a user to input information to the software." at column 5, line 64).

Art Unit: 2624

Regarding Claim 6: Chen discloses wherein the two images are related by the color statistics and the spatial coherence (“...(a) generating intensity parameters corresponding to image features in each of two intensity images of a scene...” at column 3, line 32).

Regarding Claims 5 and 7: Chen discloses wherein an underexposed one of the two images is enhanced and downloading the two images to a general-purpose computer, the general-purpose enhancing one of the two images (“In a typical implementation of the invention, the computer program product bearing the inventive algorithms would either be provided directly to a user... or it would be used in a shared setting, where a customer would bring pictures and/or negatives ...for scanning and enhancement, or would directly enter digital scan data into the shared computer. Alternatively, the algorithms could be made available in a web-based version of the product, where either the algorithms are downloaded via the network connection to the user or the algorithm computation is done on a server in a web-based environment.” at column 12, line 18).

Regarding Claim 8: Chen discloses equally resembling claimed elements as mentioned in claims 6 and 7, therefore claim 8 is rejected for the same reasoning’s as stated above in claims 6 and 7.

Regarding Claims 10, 28 and 39: Chen discloses utilizing color histogram equalization to determine the color statistics (“...computing a histogram of the number of the feature points that still have depth values in a column-wise

Art Unit: 2624

fashion, therefore to further deprive the depth values at feature points that do not belong to the majority of the remaining feature points that have depth values.” at column 4, line 8).

Regarding Claim 12, 30 and 40: Chen discloses utilizing spatial region matching to determine the spatial coherence (“...(b) eliminating one or more pairs of intensity parameters based on one or more constraints related to the feasibility of a valid match between the pairs of intensity parameters...” at column 3, line 38).

Regarding Claim 15: Chen discloses, wherein the method is performed by a digital camera (“It is also instructive to note that the images are either directly input into the computer system (for example by a digital camera) or digitized before input into the computer system (for example by scanning an original, such as a silver halide film).” at column 5, line 51).

Regarding Claim 16: Chen discloses one or more computer readable media storing computer executable instructions that, when executed, perform the method as recited in claim 1, wherein the one or more computer readable media are incorporated inside a digital camera (“Any images stored in the PC card 130, the floppy disk 126 or the computer disk 134, or input through the network connection 127, may have been obtained from a variety of sources, such as a digital camera (not shown) or a scanner (not shown).” at column 6, line 32).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 2-4, 9, 17-20, 22, 24, 25, 27, 32, 33, 35, 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen (US 6,556,704) in combination with Hamilton (US 6,075,889).

Regarding Claim 2:

Chen discloses providing two images of a same scene; determining a spatial coherence and color statistics of the two images; and utilizing the determined color statistics and spatial coherence to enhance one of the two images.

Chen does not expressly disclose that one of the images [is] taken in dim lighting condition[s].

Hamilton teaches wherein the images are taken in a dim lighting condition ("The exposure section 10 exposes the image sensor 12 to image light for a time period dependent upon exposure requirements, for example, a time period between 1/1000 second and several seconds." at column 4, line 4).

At the time the invention was made, it would have been obvious to one of ordinary skill in the art to utilize taking one image with dim lighting

Art Unit: 2624

condition[s] as taught by Hamilton and adding that condition to the one of two images of the same scene as disclosed by Chen because the light exposure time period will allow the image sensor as taught by Hamilton to gage the appropriate color statistics and spatial coherence and produce the most optimal luminance correction possible.

Regarding Claim 3:

Chen discloses providing two images of a same scene; determining a spatial coherence and color statistics of the two images; and utilizing the determined color statistics and spatial coherence to enhance one of the two images.

Chen also does not expressly disclose that one of the images [is] is underexposed.

Hamilton teaches wherein one of the two images is underexposed ("Although not shown, the exposure section 10 includes conventional optics for directing the image light through a diaphragm, which regulates the optical aperture, and a shutter, which regulates exposure time." at column 3, line 6).

Regarding Claim 4: Hamilton teaches wherein one of the two images is blurred ("A digital image from the image buffer 18 of FIG. 1 is applied to a blur block 42..." at column 5, line 2).

Regarding Claims 9, 27 and 38:

Chen discloses means for providing two images of a same scene; means for determining a spatial coherence and color statistics of the two images; and means for utilizing the determined color statistics and spatial coherence to enhance one of the two images.

Chen does not expressly disclose means for modifying a color mapping function of the two images to cover a relatively larger range for a high contrast scene.

Hamilton teaches means for modifying a color mapping function of the two images to cover a relatively larger range for a high contrast scene (Refer to Figures 3(a) and 3(b); "Finally an RGB values block 36 computes the image in Red(R), Green (G), Blue (B) format which are used for an image display or for making a hard copy output... The purpose ... is to remove the high frequency components from the digital image." at column 4, line 57).

It would have been obvious to one of ordinary skill in the art, at the time the invention was made to modify the color mapping function as taught by Hamilton to conform with the design of utilizing the color statistics and spatial coherence to enhance one of the two images as disclosed by Chen because the manipulation of the color spaces allows the user to remove artifacts and also creates an environment where the apparatus can process user information in a variety of ways.

Regarding Claims 17 and 32:

Chen discloses providing two images of a same scene; determining a spatial coherence and color statistics of the two images; and utilizing the determined color statistics and spatial coherence to enhance one of the two images.

Chen does not expressly disclose providing an underexposed image of a scene and providing a blurred image of the same scene.

Hamilton teaches providing an underexposed image of a scene ("Although not shown, the exposure section 10 includes conventional optics for directing the image light through a diaphragm, which regulates the optical aperture, and a shutter, which regulates exposure time." at column 3, line 6); providing a blurred image of the same scene (A digital image from the image buffer 18 of FIG. 1 is applied to a blur block 42 which computes low frequency luminance values. Reference will now be made to FIG. 4 where a 5x5 blur kernel arrangement is shown." at column 5, line 2).

At the time the invention was made, it would have been obvious to one of ordinary skill in the art to add an underexposed image and a blurred image of a scene as taught by Hamilton as the two scenes of interest as disclosed by Chen because these multiple forms of images will resolve the photographic effects of most cameras and their similar pitfalls.

Art Unit: 2624

Regarding Claim 32:

Hamilton teaches one or more computer-readable media having instructions stored thereon that, when executed, direct a machine to perform acts comprising: providing an underexposed image of a scene; providing a blurred image of the same scene; determining a spatial coherence and color statistics of the images; and utilizing the determined color statistics and spatial coherence to enhance the underexposed image ("The present invention can be embodied in a computer program stored on a computer readable product such as, for example, magnetic storage media, such as a magnetic disk (for example, a floppy disk), magnetic tape, optical disks, optical tape, or machine readable memory." at column 9, line 36).

Regarding Claim 18: Hamilton teaches wherein the images are taken in a dim lighting condition wherein the images are taken in a dim lighting condition ("The exposure section 10 exposes the image sensor 12 to image light for a time period dependent upon exposure requirements, for example, a time period between 1/1000 second and several seconds." at column 4, line 4).

Regarding Claim 19: Chen discloses wherein the images are taken successively in a short interval (" In practice, the cameras are arranged in such a way that the value of one of the disparities is always considered to be zero." at column 6, line 64).

Regarding Claims 20 and 33: Chen discloses utilizing color histogram equalization to determine the color statistics ("...computing a histogram of the

Art Unit: 2624

number of the feature points that still have depth values in a column-wise fashion, therefore to further deprive the depth values at feature points that do not belong to the majority of the remaining feature points that have depth values.” at column 4, line 8).

Regarding Claims 22 and 35: Chen discloses utilizing spatial region matching to determine the spatial coherence (“...(b) eliminating one or more pairs of intensity parameters based on one or more constraints related to the feasibility of a valid match between the pairs of intensity parameters...” at column 3, line 38).

Regarding Claim 24: Hamilton discloses, one or more computer readable media storing computer executable instructions that, when executed, perform the method as recited in claim 17 (“The present invention can be embodied in a computer program stored on a computer readable product such as, for example, magnetic storage media, such as a magnetic disk (for example, a floppy disk), magnetic tape, optical disks, optical tape, or machine readable memory.” at column 9, line 36).

Regarding Claim 25: Chen discloses, wherein the method is performed by a digital camera (“It is also instructive to note that the images are either directly input into the computer system (for example by a digital camera) or digitized before input into the computer system (for example by scanning an original, such as a silver halide film).” at column 5, line 51).

8. Claims 11, 14, 21, 29, 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen (US 6,556,704) in combination with Hamilton (US 6,075,889) and Kang (US 6,879,731).

Regarding Claim 14:

Chen discloses providing two images of a same scene; determining a spatial coherence and color statistics of the two images; and utilizing the determined color statistics and spatial coherence to enhance one of the two images.

Chen does not expressly disclose using an exposure bracketing feature of a digital camera to provide the two images.

Kang in the same field of luminance correction teaches using an exposure bracketing feature of a digital camera to provide the two images (Many still picture cameras today allow for auto bracketing. When auto bracketing a scene, the camera determines the correct exposure via the current metering mode, and then additionally captures the scene at shorter and longer exposures. The present HDR video system modifies this approach in that instead of bracketing with a fixed multiple of the middle exposure, a set of exposures more appropriate for the scene is automatically determined." At column 17, line 60).

At the time the invention was made, it would have been obvious to one of ordinary skill in the art to add an exposure bracketing feature as taught by

Art Unit: 2624

Kang to the apparatus and method of providing two images of the same scene as disclosed by Chen because at the time the invention was made, many picture cameras allow for automatic bracketing. This provides the user with an all inclusive apparatus and method of manipulating the data of the two images.

Regarding Claims 11, 21, 29 and 34: Kang discloses utilizing color histogram equalization to determine the color statistics, wherein the color histogram equalization comprises: transferring the two images to a perception-based color space ("FIG. 4 is a combined intensity histogram of the two images shown in FIG. 3 in radiance space. The left hand side of the plot corresponds to the long exposure frame, while the right hand side of the plot corresponds to the short exposure frame." at column 12, line 45); clustering color distributions in the perception-based space (The HDR video generation system and process can also involve tone-mapping of the radiance map to convert it into an 8-bit representation of the HDR frame that is suitable for rendering and display." at column 10, line 66); performing histogram equalization in the perception-based space (Referring to FIGS. 5A-B, the first step in calculating exposure settings to be used in capturing subsequent frames is to compute an intensity histogram for each of a pair of immediately preceding, already captured frames (process action 500)." at column 18, line 38); and transferring a result of the histogram equalization to a red-green-blue space ("The CIE space image is then converted to produce the final 8-bit range RGB image." at column 11, line 6).

Allowable Subject Matter

9. Claims 13, 23, 31 and 36 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mia M. Thomas whose telephone number is 571-270-1583. The examiner can normally be reached on Monday-Friday 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Werner can be reached on 571-272-7401. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2624

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Mia M Thomas
Examiner
Art Unit 2624

MMT 

/Brian P. Werner/
Supervisory Patent Examiner (SPE), Art Unit 2624